Fact Sheet

United States Environmental Protection Agency
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, WD-134
Seattle, Washington 98101
(206) 442-1214

Date: July 30, 1987

Permit No.: ID-002540-2

PROPOSED REISSUANCE OF A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE POLLUTANTS PURSUANT TO THE PROVISIONS OF THE CLEAN WATER ACT

CYPRUS THOMPSON CREEK
P.O. Box 62
Clayton, Idaho 83227

has applied for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge pollutants pursuant to the provisions of the Clean Water Act. This fact sheet includes (a) the tentative determination of the Environmental Protection Agency (EPA) to reissue the permit, (b) information on public comment, public hearing and appeal procedures, (c) the description of the current discharge, (d) schedules of compliance and other conditions, and (e) a sketch or detailed description of the discharge location. We call your special attention to the technical material presented in the latter part of this document.

Persons wishing to comment on the tentative determinations contained in the proposed permit reissuance may do so by the expiration date of the Public Notice. All written comments should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the expiration date of the Public Notice, the Director, Water Division, will make final determinations with respect to the permit reissuance. The tentative determinations contained in the draft permit will become final conditions if no substantive comments are received during the Public Notice period.

The permit will become effective 30 days after the final determinations are made, unless a request for an evidentiary hearing is submitted within 30 days after receipt of the final determinations.

The proposed NPDES permit and other related documents are on file, may be inspected, and copies made at the above address any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to EPA at the above address to the attention of the Water Permits Section, or by calling (206) 442-1214. This material is also available from the EPA Idaho Operations Office, 422 West Washington Street, Boise, Idaho 83702. A copying machine is available in the Seattle Office for public use at a charge of 20 cents per copy sheet. There is no charge if the total cost is less than 25 dollars.

I. Applicant

Cyprus Thompson Creek
P.O. Box 62
Clayton, Idaho 83227

NPDES Permit No.: ID-002540-2

II. Facility Location and Activity

The applicant (Cyprus) owns and operates an open pit molybdenum mine and concentration mill (SIC 1061) located 35 miles southwest of Challis, Idaho, in Custer County (Attachments #1 and #2). Process mill wastewater and mine drainage is contained in a tailings impoundment. Discharges consist of storm water runoff from waste rock dumps (outfalls #001 and #002) and storm water runoff from the mine access road (outfall #003).

III. Receiving Water

The mine site is drained by Thompson and Squaw Creeks, tributaries of the Salmon River (Attachment #2). Both drainages are classified by the State of Idaho for designated uses as agricultural water supply, secondary contact recreation and habitat for cold water biota and salmonid spawning. The Salmon River, at the points of confluence with Thompson and Squaw Creeks, has been classified as a Special Resource Water (Idaho Water Quality Standards and Wastewater Treatment Requirements, 1985, Section 1-2130).

IV. Background

The mine is located on property managed by the U.S. Forest Service (USFS), Challis National Forest, and the Bureau of Land Management. An Environmental Impact Statement (EIS) was published by the USFS on October 31, 1980. The selected alternative was that proposed by Cyprus and consisted of waste dumps located around the mine pit, and a "no discharge" tailings impoundment located in the upper Bruno Creek watershed.

An NPDES permit application was submitted by the company on April 14, 1980, for discharge of storm water runoff from waste rock dumps into Pat Hughes and Buckskin Creeks, both of which are tributaries of Thompson Creek. A permit was issued effective June 10, 1981, which expired on June 10, 1986. An application for permit reissuance was submitted on December 19, 1985. Due to uncertainties in the molybdenum market and a pending mine closure, the terms of the expired permit were continued in accordance with the Administrative Procedures Act [5 U.S.C. 558(c)]. On December 6, 1986, Cyprus announced a new mining plan based on an approximate 45% reduction in milling operations in hopes of assuring continued operation of the mine for an additional 3-5 years.

The Cyprus tailings impoundment is located at the headwaters of Bruno Creek, a tributary of Squaw Creek. Containment of mill tailings is accomplished by diversion of Bruno Creek headwaters and a seepage pump back system. There is no discharge from the tailings impoundment to any surface waters. Seepage from the impoundment is collected in the seepage pond and pumped back to the impoundment. A water quality monitoring program outlined in the following sections has been implemented to quantify potential impacts from impoundment seepage.

V. Basis for Permit Limitations

Discharges of storm water runoff from waste rock disposal areas enter two small intermittent tributaries to Thompson Creek; Buckskin Creek and Pat Hughes Creek. Instream settling ponds have been constructed in both drainages, and are designed and maintained to provide for 24-hour detention of normal spring flows, in addition to a 10-year, 24-hour storm event. Previous permit conditions established suspended solids (TSS) and pH limitations, in addition to quarterly effluent monitoring requirements for cadmium, copper, zinc and arsenic. The permit also required turbidity monitoring at selected stations to verify compliance with State Water Quality Standards.

On December 3, 1982, EPA promulgated effluent guidelines for the Ore Mining and Dressing Point Source Category 40 CFR Part 440 (Subpart J). These guidelines establish specific technology based limitations for molybdenum mining and milling. Section 301 of the Clean Water Act requires that more stringent water quality based limitations be applied when the application of effluent guidelines interferes with the attainment or maintenance of existing water quality standards. In order to establish effluent limitations for the subject permit, EPA considered existing water quality data, Discharge Monitoring Reports (DMRs) submitted by the company, promulgated effluent guidelines, State Water Quality Standards and EPA Quality Criteria for Water (1986) for fresh water biota. Receiving water monitoring and DMR data are summarized on Attachment #3. Attachment #4 compares applicable Best Available Treatment (BAT) effluent guidelines limitations with water quality based criteria for toxic metals.

A. Outfalls #001 and #002 (Waste Rock Dumps)

1. Flow

Discharge volumes from outfalls #001 and #002 are not limited since flows from the in-line settling ponds vary with seasonal and climatic conditions and are not controlled by the permittee. Flows from outfall #001 typically occur during the spring and early summer during snowmelt, while discharges from outfall #002 usually occur year round.

Discharge and receiving water flows were used to establish water quality based effluent limitations. Flow data summarized on Attachment #3 show maximum flow periods to be the limiting basis for dilution calculations. During the low flow conditions, effluent discharges are either nonexistent or minimal. Application of the worst case flow conditions and the state's mixing zone policy of allowing only 25% of the volume of the receiving stream flow, results in a conservative 4.8 to 1 dilution (see Attachment #5). This dilution is used in calculating water quality based toxic effluent limitations.

2. Metals

Chronic and acute toxicity criteria (EPA, 1986) were used as the basis for calculating permit effluent limitations for arsenic, cadmium, lead, mercury, copper and zinc. EPA's "Permit Writer's Guide to Water Quality-Based Permitting for Toxic Pollutants" (February 1987), Table 3.1 was used to calculate the permit limits.

Attachment #7 contains the calculations for the final permit limits. The first two columns of numbers are the acute (criteria maximum concentration, CMC) and the chronic (criteria continuous concentration, CCC) criteria for the various metals from EPA's Water Quality Criteria (the "Gold Book").

Step 1 converts the CMC and CCC into acute and chronic waste load allocations (WLA), WLA_a and WLA_c, respectively. These allocations were derived as follows:

$$WLA_a = (2) \times (CMC)$$
$$WLA_c = (\text{Dilution Factor}) \times (CCC) = 4.8 \times (CCC)$$

Step 2 converts the WLA_a and WLA_c to long term averages (LTA), LTA_a and LTA_c.

Step 3 selects the lower of LTA_a and LTA_c.

Step 4 derives the permit limit from the limiting LTA.

For this permit, only a daily maximum limit was calculated since the permit requires only monthly monitoring. The derived limits of Step 4 are then compared to the effluent guidelines, see Attachment #4. The more stringent of the two become the permit effluent limits.

The derived limit for mercury is 0.000057 mg/l or 0.057 ug/l. The lower detection level for mercury is 0.2 ug/l. Since the derived limit is less than the detection level, the permit limit for mercury is "non-detectable."

3. TSS:

Previous permit limitations of 20 mg/l daily average and 30 mg/l daily maximum will be retained in the reissued permit. These limitations are based on effluent guidelines and considered sufficient to assure compliance with water quality standards, based on past monitoring data.

4. pH:

pH is limited in the range 6.0 - 9.0, and reflects effluent guidelines. Past monitoring data has shown this limitation adequate to protect water quality standards.

B. Outfall #003 (Mine Access Road Stormwater Diversion)

The permittee will be required to monitor turbidity above and below the Bruno Creek access road stormwater settling ponds to assure compliance with State Water Quality Standards. This monitoring shall be performed in accordance with requirements of the water quality monitoring program established by the USFS, IDHW-DOE and Cyprus (Attachment #8).

VI. Basis for Monitoring Requirements

The permittee will be required to comply with the following monitoring requirements for outfalls #001 and #002:

Parameter	Frequency
Flow	Daily
pH	Weekly
TSS	Weekly
Arsenic	Monthly
Cadmium	Monthly
Lead	Monthly
Mercury	Monthly
Copper	Monthly
Zinc	Monthly

The above monitoring requirements are considered adequate to characterize the permittee's discharge. Effluent quality from the tailings pond should not vary significantly from week to week. Therefore, metals monitoring will be monthly. An indication of variablity in the effluent quality can be noted in a significant change in pH, TSS, and flow. Consequently, these parameters will be monitored more frequently.

Cyprus Thompson Creek Water Monitoring Program

In addition to the above referenced monitoring, the permittee shall continue to provide for water quality monitoring in accordance with the program agreed upon by the USFS, IDHW-DOE and the permittee. The major areas covered by the water quality plan are as follows:

1. Surface water quality of Thompson and Squaw Creek drainages.

2. Quantity and quality of effluent released from settling ponds on Pat Hughes and Buckskin Creeks.

3. Surface and groundwater quality in the tailings impoundment drainage basin.

4. Quality of groundwater developed as potable sources for workers at the mine site.

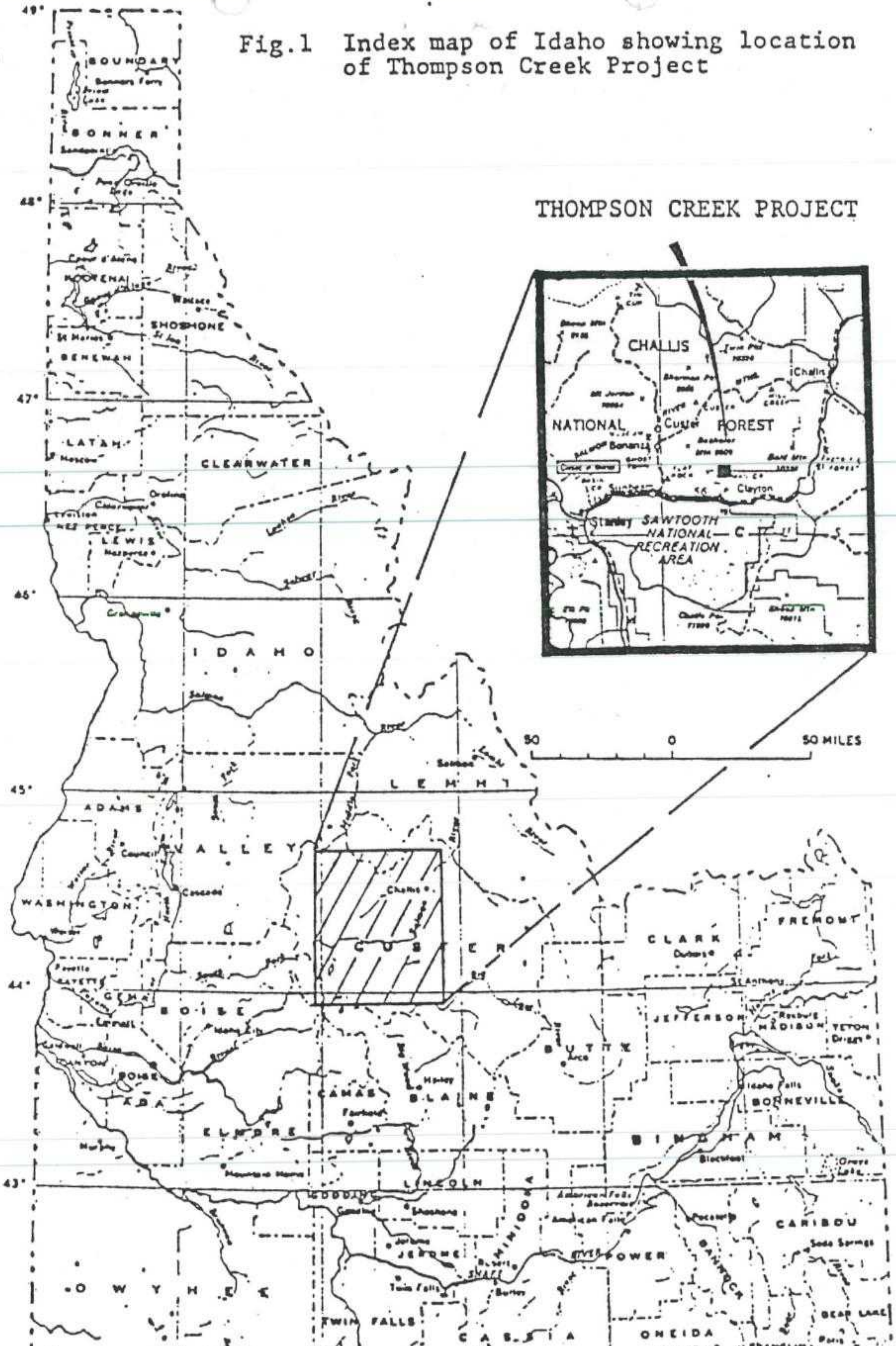
5. Fish and invertebrate populations of streams draining the active mine and mill operation areas.

Attachment #8 summarizes this monitoring program.

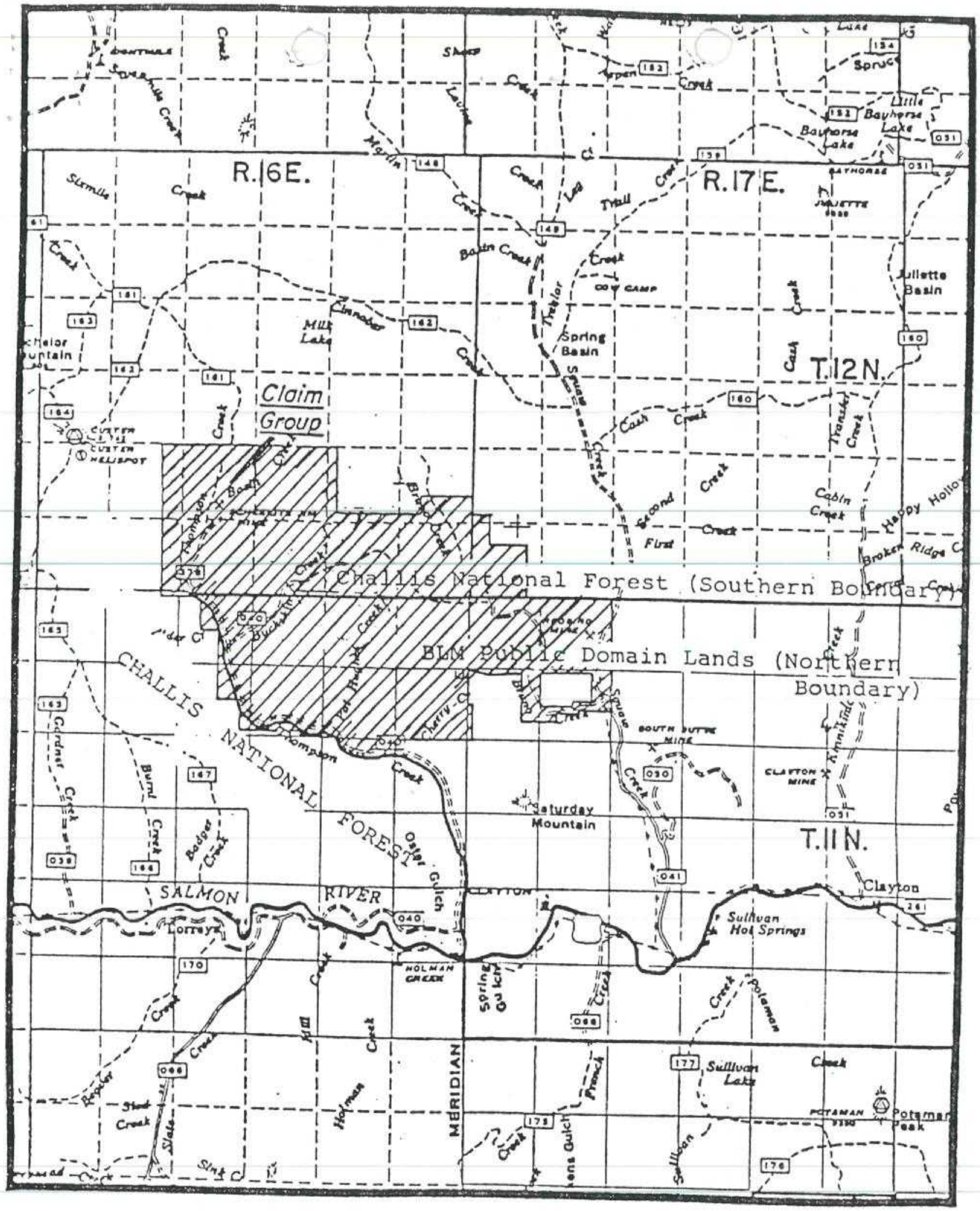
VII. Other Conditions

The permit is proposed to be effective for a period of five (5) years, and subject to modification should monitoring results indicate adverse water quality impacts.

Fig.1 Index map of Idaho showing location of Thompson Creek Project



ATTACHMENT #1



SCALE

0 2 4 6 Miles

Fig.2 Location of Thompson Creek Project, Custer Co., Idaho

ATTACHMENT #2

ATTACHMENT #3

CYPRUS THOMPSON CREEK

DATA SUMMARY (1981 - 1986)

	Thompson Creek (Upstream)			Buckskin Creek (001)			Pat Hughes Creek (002)			Thompson Creek (Downstream)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Flow (cfs)				0	9.5	0.6	0	8.6	0.5	4.8	132	24.3
pH	6.6	8.6	7.6	7.6	7.75	7.9	7.7	7.95	8.1	7.0	8.9	7.6
TSS (mg/l)	0	52	6	1.0	57.0	6.32	1.0	95.0	8.1	0	80	8.4
AS (mg/l)	<0.005	0.02	1 + sample	<0.005	0.1		<0.005	0.31		All <0.005		
Cd (mg/l)	All<0.005			0.001	0.005		0.001	0.005		All <0.005		
Pb (mg/l)	All<0.05			No data			No data			All <0.05		
Hg (mg/l)	<0.0005	0.0015	5 + samples	No data			No data			<0.0005	0.0016	3 + samples
Cu (mg/l)	<0.01	0.02	5 + samples	<0.01	0.01		<0.01	0.01		All <0.01		
Zn (mg/l)	0.003	0.044	0.018	0.005	0.54	0.025	<0.01	0.083	0.037	0.001	0.028	0.016

ATTACHMENT #4

CYPRUS THOMPSON CREEK

TOXIC EFFLUENT LIMITATIONS SUMMARY
(All numbers are in mg/l)

PARAMETER	Effluent Guidelines[1] Daily Avg.	Effluent Guidelines[1] Daily Max.	Water Quality Criteria (EPA "Gold Book" Criteria) acute (CMC)	Water Quality Criteria (EPA "Gold Book" Criteria) chronic (CCC)	Derived Limits[2] Daily Max.	Permit Limits[3] Daily Maximum
Arsenic	N/A	N/A	0.19	0.36	0.49	0.49
Cadmium 0.0053	0.05	0.10	0.011	0.039	0.0053	
Lead	0.3	0.6	0.032	0.082	0.015	0.015
Mercury	0.001	0.002	0.000012 < detectable	0.0024	0.000057	0.000057
Copper 0.0245	0.15	0.30	0.012	0.018	0.0245	
Zinc	0.75	1.5	0.047	0.32	0.163	0.163

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1. 40 CFR 440 Subpart J

2. From the last column of Attachment #7

3. Permit limits are the more stringent of the effluent guidelines (columns 1 and 2) and the derived limit (column 5)

ATTACHMENT #5

Calculation of dilution factor using flow data from Attachment #3 and the states mixing zone standard (1-2400.03(e)(4)) to include only 25% of the volume of the receiving stream flow, the dilution factor is:

$$\frac{132\ (25\%) + 8.6}{8.6} = 4.8$$

ATTACHMENT #6

Step 2, to calculate LTA_C

Assume $n = 1$ (the number of samples collected per month)
$CV = 0.6$ (Coefficient of variation is unknown. The permit writer's guide recommends $CV = 0.6$ if the CV is unknown.)
$Z = 1.645$ (for the 95th percentile)

$$LTA_C = e^{(u + .5\sigma^2)}$$

Where, $\sigma^2 = \ln (CV^2 + 1)$

$$= \ln (0.6^2 + 1) = 0.30748$$

and $u = \ln (WLA_C) - Z\sqrt{\ln [1 + ((e^{\sigma^2} - 1)/n)]}$

$$= \ln (WLA_C) - 1.645\sqrt{\ln [1 + ((e^{\sigma^2} - 1)/1)]}$$

$$= \ln (WLA_C) - 1.645\sqrt{\ln (e^{\sigma^2})}$$

$$= \ln (WLA_C)\ 1.645\ (\sigma)$$

$$u = \ln (WLA_C) - 0.912$$

Then, $LTA_C = e^{(\ln WLA_C - 0.912 + .5\ (.30748))}$

$$LTA_C = 2.71828^{(\ln WLA_C - 0.75826)}$$

ATTACHMENT #7

Derivation of Permit Effluent Limitations[1/]
(All numbers are in mg/l)

	Gold Book[2/] CMC / CCC Acute / Chronic		WLAa / WLAc (Step 1)		LTAa / LTAc (Step 2)		(Step 3)	Derived Limitation[4/] Daily Maximum, mg/l (Step 4)
As	.36	.19	0.72	0.912	.23	.427	.23	.49
Cd	.0039	.0011	0.0078	.0053	.002496	.00248	.00248	.0053
Pb	.082	.0032	0.164	.015	.052	.00703	.00703	.0150
Hg	.0024	.000012	0.0048	.000057	.001536	.0000267	.0000267	.000057
Cu	.018	.012	0.036	.0576	.01152	.027	.01152	.0245
Zn	.120	.110	0.240	.528	.0768	.247	.0768	0.163

1. This chart of numbers contain the calculations which are used to derive permit limits that will protect against both acute and chronic instream effects. The process for this derivation are found in EPA's "Permit Writer's Guide to Water Quality-Based Permitting For Toxic Pollutants," (February 1987), Table 3.1.

2. Water Quality Criteria, The "Gold Book" Criteria

3. CMC = Criteria Maximum Concentration
   CCC = Criteria Continuous Concentration

4. (Step 3) x 2.13 = Step 4 = Maximum Daily Limit

   2.13 is from the table in Step 4 from Table 3.1 for CV = 0.6

CYPRUS THOMPSON CREEK

WATER QUALITY MONITORING PROGRAM

1987

Attachment #8

TABLE OF CONTENTS

APPENDICES

A) Field and Lab Data Forms

B) Recommendations for Sample Preservation

C) Laboratory Methods

CYPRUS THOMPSON CREEK WATER MONITORING PROGRAM 1987

1.0 INTRODUCTION

This document describes the Standard Operating Procedures for the collection and analysis of surface and ground water samples from the Cyprus Thompson Creek Mine. The data obtained during the years 1982-86 have been reviewed to produce this plan.

1.1 OBJECTIVES

The water quality monitoring program has been designed to obtain samples and analytical results that give true indications of the quality of mine area waters. The information obtained from the monitoring program will be used to assess the effectiveness of mitigation measures. The major areas covered by this water quality monitoring plan are as follows:

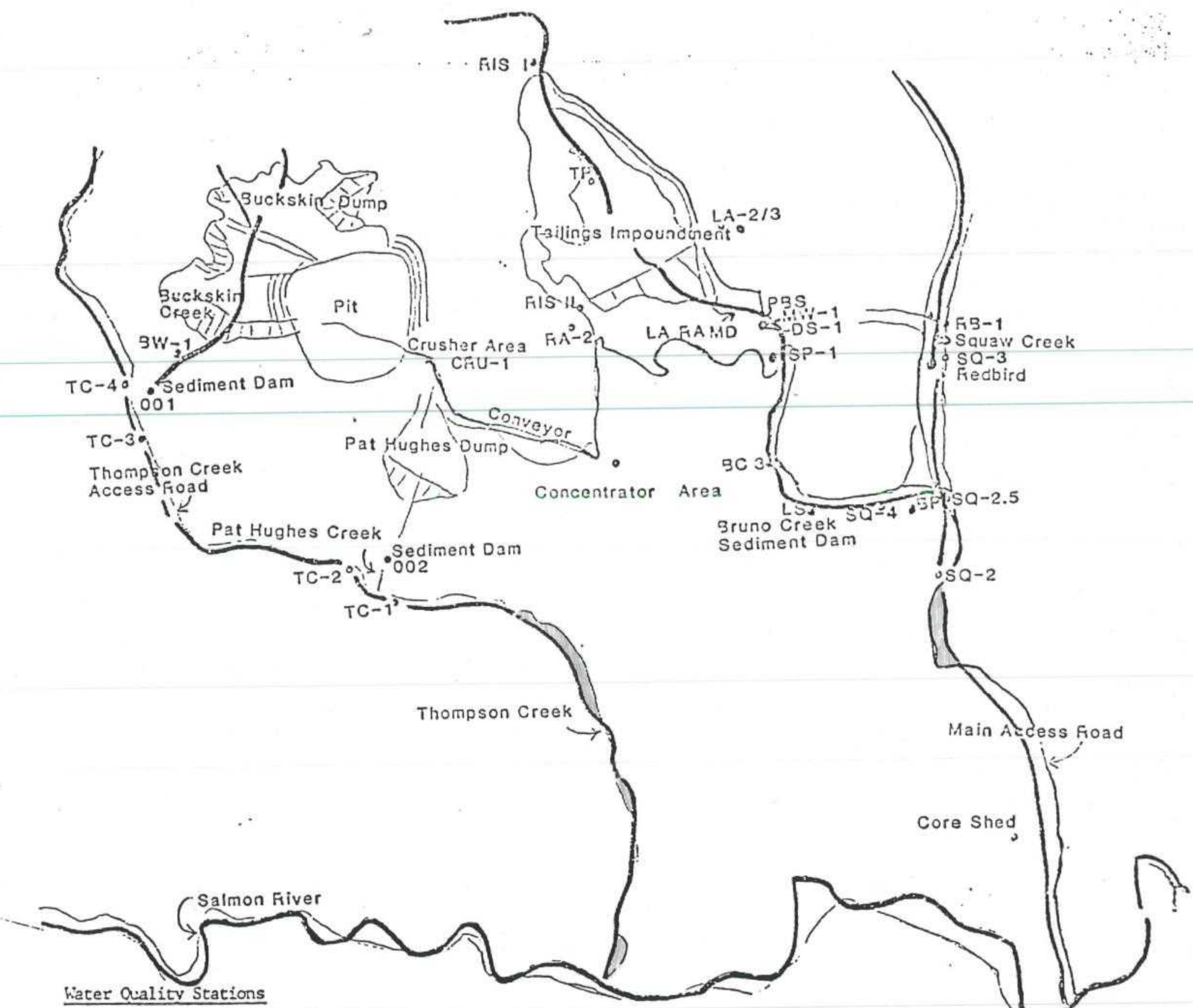
- Surface water quality of the Squaw and Thompson Creek drainages.
- Quantity and quality of effluents released from settling ponds on Pat Hughes and Buckskin creeks.
- Surface and ground water quality in the tailings impoundment drainage basin.
- Quality of ground water developed as potable sources for workers at the mine site.
- Fish and invertebrate populations of streams draining the active mine and mill operation areas.

1.2 SITE DESCRIPTIONS

1.2.1 Surface Water Stations:

Surface water sites on Squaw and Thompson Creeks were chosen prior to construction for monitoring primary and secondary impacts of mining activities.

Cyprus Thompson Creek



Water Quality Stations

001	Buckskin Sediment Dam
TC-4	Above Buckskin Creek
TC-3	Below Buckskin Creek
BW-1	Artesian Well above Buckskin Dam
002	Pat Hughes Sediment Dam
TC-2	Above Pat Hughes Creek
TC-1	Below Pat Hughes Creek
SQ-2	Below Guard Gate on Squaw Creek at USGS Station
SQ-2.5	250 ft. below confluence of Squaw and Bruno Creek
SQ-3	Below Redbird Mine at Squaw Creek
RB-1	Creek above Redbird Mine/drains from west into Squaw Creek
SQ-4	Above Guard Gate at USGS Station
LS	Limestone Spring Sediment Dam (above SQ-4)
BP-1	Beaver Pond (below Limestone Spring at Bruno Creek Mouth)
003	Beaver Pond Stormwater D.P.
BC-3	Bruno Creek Well at Pope John Boulevard
RA-2	Right Abutment/Tailings Well
LA-2/3	Left Abutment/Tailings Wells
LA	Left Abutment of Rock Toe
SRD	Seepage Return Dam Pond
MD	Rock Toe - Main Drain from Paddocks into SRD Pond. Center, lower weir.
RA	Right Abutment of Rock Toe
PBS	Pump Back Station (below SRD)
MW-1	Monitoring Well (below Pump Back)
DS-1	Down Stream Spring (below Pump Back)
SP-1	Sediment Pond (1/4 mile below Pump Back)
RIS I	Upper Bruno Creek
TP	Tailings Pond Water (barge)
RIS II	Right abutment above drop boxes
DD	Diversion Ditch left of tailings

The following is a list of the general surface water sampling locations:

SQ-2: Squaw Creek below the confluence with Bruno Creek and 25 feet above the second bridge above the gate.

SQ-2.5: Squaw Creek 250 feet below the confluence with Bruno Creek (at boulder).

SQ-3: Squaw Creek above the confluence with Bruno Creek and 100 feet below Redbird mine.

SQ-4: Bruno Creek at the US Gauging Station (USGS)and above the guard gate.

TC-1: Thompson Creek 250 feet below the confluence with Pat Hughes Creek and one mile above the Transfer Pump Sump.

TC-2: Thompson Creek one-fourth mile above confluence with Pat Hughes Creek and below the confluence with Unnamed Creek.

TC-3: Thompson Creek above the confluence with Unnamed Creek and below the confluence with Buckskin Creek.

TC-4: Thompson Creek above the confluence with Buckskin Creek and below the confluence with Alder Creek.

001: Buckskin Creek sediment dam discharge point.

002: Pat Hughes Creek sediment dam discharge point.

003: Beaver Pond Sediment Control Structure - Stormwater Discharge Point on Bruno Creek.

1.2.2 Tailings Area:

Surface and ground water stations shown in Figure 2. The following is a brief description of these stations:

Surface Water Stations:

TP: Tailings pond (barge).

RIS I: (Upper) Head of Bruno Creek at juncture of the RIS road and one-fourth mile from the north end of the Diversion Ditch.

RIS II: (Intermediate) Parallel with and above drop boxes at right abutment of the header line and on the RIS road.

RIS: (Lower) At pumpback on the right abutment.

LA: Left Abutment of the Rock Toe.

MD: Main Drain (lower, center) of the Rock Toe.

RA: Right Abutment of the Rock Toe.

DD: Diversion Ditch on left abutment above tailings line at the end of the ditch before it drops into the pipeline going to pumpback.

PBS: Pump-back system, inlet to sump on lower tailings road south of the Seepage Return Dam.

DS-1: First down stream spring 100 feet below pumpback system and 25 feet below the monitoring well on Bruno Creek (east bank).

SP-1: Sediment pond at elevation 6640 ft. on Bruno Creek, one half mile below pumpback system.

RB-1: Redbird Creek tributary to Squaw Creek one mile above Redbird Mine..

Ground Water Stations:

MW-1: Monitoring well located approximately 100 feet below the Seepage Return Dam.

BC-3: Former production well on lower Bruno Creek at Pope John Boulevard.

LA-2: Monitoring well located on the left abutment above the center line of the tailings impoundment.

LA-3: Monitoring well located on the left abutment (east upper ridge) of the tailings impoundment.

RA-2: Monitoring well located on the right abutment (west edge) of the tailings impoundment and one half mile off of the old upper mine (motivator) road.

Deleted Stations:

SQ-1: Mouth of Squaw Creek, below former construction camp.

RT: Main drain below rock toe. (Name changed to MD - new weir constructed in 1986, approximately 100 feet below old site.)

SS-4: SRD spring #4 located between the SRD and the pumpback system.

SD: SRD main drain located just below the seepage return dam.

1.2.3 Potable Water Wells and Sampling Locations:

Locations of potable water wells are shown in Figure 3. They are as follows:

CON-1: Concentrator Well #1 which supplies the administration building, the analytical lab and the concentrator.

CRU-1: Crusher Well #1 which supplies all facilities at the crusher site.

Samples will be collected from each of the distribution systems served by these wells.

1.2.4. Other Wells

BW-1: Artesian Well 200 feet below Buckskin Dump.

2.0 WATER QUALITY MONITORING PROGRAM 1986 - Summary of Changes

Intensive water quality monitoring of 3 streams located on the Cyprus Thompson Creek claim area has been on going since 1980. Five and a half years of data (2½ yrs. post construction) have been collected for Bruno, Squaw, and Thompson Creek. Two and a half years of data have been collected for 10 stations in the tailing area. With three and a half years of monitoring during production, parameter trends influenced by tailing deposition have been characterized.

The plan objective is to monitor for downstream detection of significant process water influence and to prevent unnecessary contamination of Squaw and Thompson Creeks. The best indicators of process water influence is a sharp or significant increase in conductivity and chloride and to a slower degree, sulfate and molybdenum. Therefore, parameters such as calcium, magnesium, potassium, sodium, fluoride, bromide and sulfide, hardness, and TDS which have already been characterized for each stream have been reduced to an annual scan of all parameters at SQ-2. They would be reinstated if and when the indicator parameters showed evidence of contamination. Process water monitoring will be conducted at one location, the pumpback system, and will continue on an annual basis for all parameters at Station TP. All downstream stations, with one exception will be retained for monitoring. The exception, SQ-1 at the mouth of Squaw Creek was originally sampled primarily to monitor effects of Cyprus' sewage waste water treatment facility which is no longer in service.

In general, a less intensive sampling frequency, along with a reduction in number of stations and parameters will be conducted. The nature of the program will be shifted from a water chemistry characterization program to an impact surveillance program.

2.1 SUMMARY TABLE OF 1987 MONITORING PROGRAM
(Numbers refer to accompanying tables indicating parameters to be analyzed).

STATION	WEEKLY	MONTHLY	QUARTERLY	ANNUAL
TP		1		1,2,3,4
MD	1	1	1	1
PBS		1	2	3
DD	5f			
LA	5f			
RA	5f			
MW-1		1	2	3
DS-1		1	2	3
SP-1		1	2	3
BC-3		1	2	3
LS	5d,f			
BP	5d,f			
SQ-4		1	2	3,6
SQ-3		1	2,8	3,6,9,10
SQ-2.5	5d			
SQ-2		1	2,8	3,4,6,9,10
RB-1			1	2,3
RA-2			1	2,3
LA-2			1	2,3
LA-3		11	11	
RIS I		1		
RIS II	5f			
RIS L	5f			
TC-1		5c*	8	1,2,3,4,6,9,10
TC-2		5c*		1,2,3,6
TC-3		5c*		1,2,3,6
TC-4		5c*	8	1,2,3,6,9,10
BW-1				1,2,3
001	5a		5b	
002	5a		5b	
BP-003-	5d			
CON-1		7a		7b
CRU-1		7a		7b

* Except when NPDES discharge point is not flowing

2.2 MONTHLY SCHEDULE OF MONITORING PROGRAM 1987

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
RIS I (clock)	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f
TP											1,2,3,4	
RIS II		5f	5f	5f	5f	5f	5f					
MD	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
LA	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
RA	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
PBS	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3*	1
MW-1	1	1,2*	1	1	1,2	1	1	1,2	1	1	1,2,3	1
RIS L		5f	5f	5f	5f	5f	5f					
DS-1	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
SP-1	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
RA-2**	11	11	11	11	1			1		1		
LA-2**	11	11	11	11	11			11		11		
LA-3**	11	11	11	11	11			11		11		
DD		5f	5f	5f	5f	5f	5f					
BC-3	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
LS		5c	5c	5c	5c	5c	5c					
SQ-4	1	1,2	1	1	1,2	1	1	1,2,6	1	1	1,2,3	1
BP												
SQ-3	1	1,2	1	1	1,2	1,10	1,8	1,2,6	1,9	1,8	1,2,3*	1
RE-1		1			1			1			1	
SQ-2.5		5d	5d	5d	5d	5d	5d					
SQ-2	1	1,2*	1	1	1,2	1,10	1,8	1,2,6	1,9	1,8	1,2,3,4	1
TC-1	5c	5c	5c	5c	5c	5c,10	5c,8	5c,6	9,5c	1,2,3* 4,8	5c	5c
TC-2	5c	5c	5c	5c	5c	5c	5c	5c,6		1,2,3	5c	5c
TC-3	5c	5c	5c	5c	5c	5c	5c	5c,6		1,2,3	5c	5c
TC-4	5c	5c	5c	5c	5c	5c,10	5c,8	5c,6	9	1,2,3,8*	5c	5c
BW-1										1,2,3		
001(clock)	5a	5a,b*	5a	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b	5a
002(clock)	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b*	5a
003(clock) (BP)	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c
CON-1	7a,b	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a
CRU-1	7a,b	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a

* Quality Control Samples, See section 5.0.
** Except under hazardous conditions.

2.3 PARAMETER GROUPS 1-10

GROUP 1
FIELD PARAMETERS

Conductivity
pH
Temperature
Turbidity

GROUP 2
IMPORTANT INDICATORS

Suspended Solids	Iron
Alkalinity	Manganese
Chloride	Molybdenum
Sulfate	
Xanthates	

GROUP 3
METALS

Copper	Zinc
Lead	Selenium
Mercury	

GROUP 4
REMAINING PARAMETERS FOR TOTAL SURVEY

Total Dissolved Solids	Aluminum
Hardness	Arsenic
Calcium	Barium
Fluoride	Cadmium
Magnesium	Chromium
Potassium	Cobalt
Silica	Nickel
Sodium	Silver
Sulfide	COD
Phosphate	Cyanide
Nitrate	

GROUP 5
SPECIAL PARAMETERS FOR COMPLIANCE

5a - Weekly (NPDES)	5b - Quarterly (NPDES)	5c - Monthly (NPDES)
Suspended Solids	Cadmium	Turbidity
pH	Copper	
Continuous Flow	Zinc	
	Arsenic	

5d - Weekly	5e - Monthly	5f - Weekly
Turbidity	pH and Flow	Staff Gauge
During runoff		During runoff
Feb. - June		Feb. - June

GROUP 6
STREAMBED SEDIMENTS: SEDIMENT LOAD

Arsenic	Mercury
Copper	Molybdenum
Iron	Zinc
Lead	
Manganese	

GROUP 7
POTABLE WATER PARAMETERS
(Required for public drinking water systems)

7 a - Monthly	7 b - Annual	
Bacteria - Total Coliform	Arsenic	Copper
	Barium	Chloride
	Cadmium	Iron
	Chromium	Manganese
	Cyanide	Sulfate
	Lead	TDS
	Mercury	Zinc
	Nitrate	Sodium
	Selenium	
	Silver	
	Fluoride	

GROUP 8
MACROINVERTEBRATE SAMPLING

Identification to species, if possible; spring, fall.

GROUP 9
FISH POPULATION SURVEY

Identification to species and count; data collected in the fall.

GROUP 10

Spawning gravel sediment sampling by USFS.
8 sieve sizes for analysis of spawning gravel suitability.

GROUP 11

Water level.

3.0 GENERAL PROCEDURES - SURFACE WATER

3.1 FIELD METHODS AND MATERIALS

The following parameters will be measured in the field on site, or during winter months, as soon as possible after surface sample collection to insure accurate results.

- o conductivity and temperature
- o pH
- o turbidity
- o air temperature

Conductivity, and water temperature will always be measured instream. Air temperature will be measured on site.

The following materials will be used in sample collection:

- o conductivity meter
- o pH meter and calibration buffers
- o turbidimeter
- o sample containers with labels
- o data forms and field notebook
- o distilled water
- o cooler(s) and ice packs or cubes
- o waterproof pen
- o thermometer

A dissolved oxygen meter will be available for use as necessary.

3.1.1 Calibration Requirements:

Field equipment will be maintained and regularly calibrated according to manufacturer's instructions.

1) pH meter - standardization required at least once monthly. Calibration with one appropriate buffer (pH 7, 9 or 10) before each set of continuous measurements is also required. These will be recorded in a permanent log book which is kept with the instrument.

2) Turbidimeter - calibration to known standard required before each sample measurement.

3) Conductivity meter - Semi-annual calibration check to known standard required.

4) Dissolved oxygen meter - when in use, complete calibration required before each series of measurements. Membrane replacement is necessary generally every 2-4 weeks.

All probes and sample beakers must be rinsed with distilled water before and after each sample measurement.

3.1.2 Sample Collection, Documentation & Preservation:

Surface water samples will be collected at each station according to the schedule contained herein (section 2.1). Sample containers will be labelled at the time of collection as follows:

Cyprus Thompson Creek
Sample Name
Date: Time:
For: (analyses required)
Preservative
Initials of collector

The general procedure for obtaining samples at each sampling station will be as follows:

- o Read staff gauge (if applicable) to determine streamflow.
- o Check battery test switch on all field instruments before use and make sure they are properly calibrated as per section 3.1.1.
- o Take an instream conductivity and temperature reading by inserting probe directly in the stream.
- o Fill sample containers, after proper labelling, by the grab sampling method taking care to avoid contamination of bottles.*
- o Take an air temperature reading making sure the thermometer is not in direct sunlight.
- o Make field measurements of pH and turbidity, by vigorously shaking the unpreserved stream sample bottle and taking a 40ml. subsample.
- o Record all information (station, date, time), measurements, and observations on the appropriate field data form (Appendix A) and sign.

* Preservation of samples will be conducted according to the recommendations outlined in Appendix B.

3.1.3 Transportation:

After sample collection, samples will be packed in ice and transported from the field to the laboratory for analysis within the recommended specified holding times (see Appendix B). The logistics of transportation will be coordinated with the testing laboratory.

3.1.4 Record Keeping:

The original copy of the field data form which also indicates sample volume collected, analyses to be performed and preservative used will be sent with samples to the water testing laboratory (Appendix A). Copies will be retained for the Cyprus files. The back of this form also provides for a lab data report to be completed and signed by the laboratory supervisor and returned to Cyprus. Copies of the lab report will be retained by the laboratory for their records.

Water monitoring results will be kept on file with the Cyprus Environmental department.

3.2 FIELD METHODS & MATERIALS - GROUND WATER

This procedure will be the same as for surface water (Section 3.1) except that

- o conductivity and temperature will be measured on site from a sample beaker.
- o well sampling apparatus (generator to operate well pump, air compressor or bailers) are required.

3.2.1 Calibration Requirements:

Requirements will be the same as for surface water (Section 3.1.1).

3.2.2 Sample Collection:

Ground water samples will be collected at each station according to the schedule contained here (section 2.2, 2.3).

Labelling will be the same as for surface water (section 3.1.2) except that

- o depth to water level using a well sounding probe will be taken before sample collection.
- o the well will be pumped for a specified time to remove from 1-2 volumes of water (volume being equal to the area of the cased well times the water depth from surface to bottom of well) before a sample is taken.
- o pumping time will be recorded and sample will be prevented from aerating as much as possible during collection.
- o in the case of drinking water wells, samples will be taken from designated faucets, after allowing water to run for 2-3 minutes.

3.2.3 Transportation:

Same as for surface water samples (3.1.3).

3.2.4 Record Keeping:

Same as for surface water samples (3.1.4).

3.3 AQUATIC BIOLOGY METHODS

3.3.1 Sampling of benthic macroinvertebrate and fish populations in Squaw and Thompson Creeks will be continued. Specific methods and materials can be found in the 1982 and 1983 reports by Chadwick and Associates, "Aquatic Biological Survey of Thompson Creek and Squaw Creek".

3.3.2 Analysis:

Invertebrates will be identified to genus and species whenever possible. Community relationships and effect of mining, if any, will be discussed.

Fish will also be identified to species and will be measured, weighed and recorded in field book.

A current copy of the USGS Report will be sent to the biologist.

3.3.3 Reporting:

An annual report will be prepared, combining the macroinvertebrate and fish population studies. This report is presented to the interagency task force for annual review.

4.0 LABORATORY ANALYSIS AND PROCEDURES

Physical and chemical analysis will be conducted by an EPA approved and state certified laboratory and/or the Cyprus Analytical Laboratory using analytical methods described in Standard Methods for the Examination of Water and Wastewater, 15th edition, American Public Health Association, 1980. See Appendix C for a list of methods used by the current laboratory contracted by Cyprus. The laboratory will comply with record keeping (Section 3.2.4) and quality assurance procedures as described in the following section.

5.0 QUALITY ASSURANCE PROGRAM

In order to produce valid water quality data from the project area, basic quality control elements will be incorporated in both field and laboratory aspects of the monitoring program.

5.1 BASIC ELEMENTS INSURING QUALITY CONTROL

- o Calibration of field instruments - covered in Section 3.1.1.
- o Proper collection and preservation of samples - covered in Section 3.1.2.
- o Time-sensitive samples will be delivered as soon as possible to be analyzed by the lab within specified holding times (See Appendix C).
- o Transfer of custody and shipment - the field sampler is responsible for proper collection, preservation, packaging and dispatching samples to the laboratory with proper sample collection forms (Section 3.1.5).
- o United Parcel Service slips will be retained for verification of shipment of samples. In case of air delivery, verification will be by telephone.
- o Custody transferred to laboratory upon delivery of samples. Laboratory is then responsible for receiving, adequately storing, and minimal handling of samples.

5.2 QUALITY ASSURANCE SAMPLING

During the course of the Water Monitoring Program, additional (standard and duplicate) samples will be utilized to determine precision and accuracy of the methods used in the laboratory according to the following schedule:

- o Each quarter duplicate samples will be taken, on a rotating basis, from one of the water quality stations being monitored.
- o EPA Quality Control samples will be procured by the laboratory on a continual basis and analyzed as a check for accuracy.
- o As an intra-laboratory check, samples may be split on a regular basis and tested again one to two times as necessary to validate results.

Quality assurance procedures and data will be fully documented and retained for future reference. Field and laboratory personnel will keep complete and permanent records of all sampling and testing to satisfy legal requirements for potential enforcement or judicial proceedings.

6.0 REPORTING

Data will be compiled and available to agencies on a monthly basis. A Yearly summary will be prepared including Aquatic report and water quality data on analysis, storm events, etc. This report is submitted to the Interagency Task Force for review.

APPENDIX A

WATER QUALITY DATA FORMS

CYPRUS THOMPSON CREEK
WATER QUALITY MONITORING PROGRAM
FIELD DATA

Station ______________ Date Collected ______________ Time ______________
Air Temperature ______________ °F Weather ______________
Conductivity ______________ umhos/cm at 25°C Sample Temp ______________ °C
pH ______________ Turbidity ______________ Staff Gauge ______________
Flow Rate ______________
Person Conducting Sampling ______________ Signed
Samples Collected: Date Mailed to Lab ______________ Time ______________

Analysis Group	Parameters to be Tested		Preservative Added	Collected Yes	Collected No	Sample Size
Physical Properties, Cations & Anions	Suspended Solids Alkalinity Hardness Calcium Chloride Magnesium Potassium	Silica Sodium Sulfate Sulfide TDS Xanthate	None			
Nutrients & ganics	Nitrogen-TKN - Nitrate - Nitrite - Ammonia	Phosphate Carbon-TOC	Sulfuric Acid (H_2SO_4)			
Other Nutrients	BOD	COD	None			
Biological	Total Coliform Bacteria Fecal Coliform Bacteria		Sodium Thiosulfate			
Trace Metals	Aluminum Arsenic Barium Cadmium Chromium Cobalt Copper Iron	Lead Manganese Mercury Molybdenum Nickel Selenium Silver Zinc	Nitric Acid (HNO_3)			
)ther Organics	Cyanide		Sodium Hydroxide (NaOH)			

arks:
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APPENDIX B

RECOMMENDATIONS FOR PRESERVATION SAMPLES

APPENDIX B

RECOMMENDATION FOR PRESERVATION OF WATER SAMPLES

Parameter	Vol. Req. (ml)	Container, Plastic or Glass	Preservative	Holding Time (3)
Alkalinity	100	P,G	Cool, 4°C	24 Hrs.
Arsenic	100	P,G	HNO_3 to pH < 2	6 Mos.
BOD	1000	P,G	Cool, 4°C	6 Hrs. (1)
COD	50	P,G	H_2SO_4 to pH < 2	7 Days
Chloride	50	P,G	None Req.	7 Days
Conductivity	50	P,G	Det. on site	No Holding
Cyanides	500	P,G	Cool, 4°C NaOH to pH 12	24 Hrs. 14 Days
Dissolved Oxygen	300	G only	Det. on site	No Holding
Hardness	100	P,G	Cool, 4°C HNO_3 to pH < 2	7 Days
Metals				
Dissolved	200	P,G	Filter on site HNO_3 to pH < 2	6 Mos.
Suspended	200	P,G	Filter on site	6 Mos.
Total	100	P,G	HNO_3 to pH < 2	6 Mos.
Mercury				
Dissolved	100	P,G	Filter HNO_3 to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)
Total	100	P,G	HNO_3 to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)

Appendix B (Continued)

Parameter	Vol. Req. (ml)	Container, Plastic or Glass	Preservative	Holding Time (3)
Nitrogen				
Ammonia	400	P,G	Cool, 4°C H_2SO_4 to pH < 2	28 Days
Kjeldahl total	500	P,G	Cool, 4°C H_2SO_4 to pH < 2	7 Days
Nitrate/ Nitrite	100	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs. (2)
Oil & Grease	1000	G only	Cool, 4°C H_2SO_4 or HCl to pH < 2	24 Hrs.
Organic Carbon	25	P,G	Cool, 4°C H_2SO_4 to pH < 2	24 Hrs.
pH	25	P,G	Det. on site	6 Hrs. (1)
Phenolics	500	G only	Cool, 4°C H_3PO_4 to pH < 4 1.0 g $CuSO_4$/1	24 Hrs.
Phosphorus Ortho- Total	50	P,G	Cool, 4°C	7 Days
Selenium	50	P,G	HNO_3 to pH < 2	6 Mos.
Sulfate	50	P,G	Cool, 4°C	7 Days
Sulfide	100	P,G	Cool, 4°C Zinc Acetate	14 Days
Temperature	1000	P,G	Det. on site	No Holding
Turbidity	100	P,G	Det. on site	No Holding

Appendix B (Continued)

(1) If samples cannot be returned to the laboratory in less than 6 hours and holding time exceeds this limit, the final reported data should indicate the actual holding time.

(2) Mercuric chloride may be used as an alternate preservative at a concentration of 40 mg/l, especially if a longer holding time is required. However, the use of mercuric chloride is discourageed whenever possible.

(3) It has been shown that samples properly preserved may be held for extended periods beyond the recommended holding time.

APPENDIX C

METHODS USED FOR WATER ANALYSES

APPENDIX C
METHODS USED FOR WATER ANALYSES BY CODE
From Standard Methods for the Examination of Water and Wastewater, 15th edition, 1980, American Public Health Association

	Method Number		Method Number
Acidity	402	Molybdenum	303C
Alkalinity	403	Bromine	405
Aluminum	303C	Cobalt	303A or **
Arsenic	**	Nickel	303A or **
Barium	303C	Nitrogen-Ammonia	417A and 417E
Boron	404A	Nitrogen--Total Kjeldahl	420A and 420B
Cadmium	303A or **	Nitrogen--Nitrate	418C
Calcium	311C or 303A	Nitrogen--Nitrite	419
Carbon Dioxide	406A	Nitrogen--Organic	420
Chloride	407A	Orthophosphate	424F
Chlorine Residual	408E	Total Phosphate	424F
Chromium	303A or **	pH	423
Conductivity	205	Potassium	303A
Color	204A	Selenium	**
Copper	303A	Silica	303C
Cyanide	412D	Silver	303A
Fluoride	413B or 413C	Sodium	303A
Hardness	314B	Solids--Total	209A and 209E
Hex Chromium	312B	Solids--Volatile	209E
Hydrogen	427D	Solids--Suspended	209D
Iron	303A	Solids--Settleable	209F
Lead	303A or **	Sulfate	426B
Magnesium	303A	Sulfide	427B and 427I
Manganese	303A	Tannin & Lignin	513
Mercury	303F		

Appendix C (continued)

	Method Number
Temperature	212
TOC	505
Turbidity	214A
Zinc	303A
Carbonate	406C or 403
Bicarbonate	406C or 403
Oil & Grease	503A and 503C
BOD	507
COD	508A
Bacteria--Total Coliform	908A and 909A*
Bacteria--Fecal Coliform	908C and 909C*
Bacteria-Fecal Strep	910A and 910B*
Bacteria--Total	907

* Either method upon request

** Analysis by Graphite Furnance Technique EPA Method 206.2, 213.2, 218.2, 219.2, 239.2, 249.2, 270.2

This list was submitted by Analytical Laboratories of Boise, Idaho, who is currently contracted by Cyprus to perform most of the analyses.